First record of Bengal Tiger, *Panthera tigris tigris* Linnaeus, 1758 (Felidae), in eastern Nepal

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Abstract

We report the first record of a Bengal Tiger, *Panthera tigris tigris*, in eastern Nepal in 2020 based on photographic evidence. We documented this evidence at 3,165 m a.s.l., which makes it the highest elevation record of a tiger in Nepal. We recorded this evidence in one of 46 trail cameras deployed for monitoring Red Pandas in the Panchthar-Ilam-Taplejung (PIT) area. The PIT area, which has non-protected status, borders India in the east. Our finding supports the importance of transboundary conservation, which will benefit local and flagship wildlife in the PIT area.

Introduction

The presence of Tiger, *Panthera tigris* (Linnaeus, 1758), is reported from 11 Asian countries (Goodrich et al. 2015). The Bengal Tiger [*P. t. tigris* (Linneaus, 1758)], hereafter tiger, is one of the six extant subspecies of Tiger (Liu et al. 2018). This subspecies is found in Nepal, India, Bhutan, Bangladesh, western China, and

western Myanmar (Luo et al. 2004; Chundawat et al. 2011). In Nepal, most of the records are limited to the lowlands and Churia range up to 700 m a.s.l. in western and central Nepal (Thapa and Kelly 2017). There are no previous records of tigers anywhere in eastern Nepal. Confirmed records are available from the Chitwan-Parsa area as the easternmost range in Nepal (DNPWC and DFSC 2018). Records of tiger extend from the sea level in India (Goodrich et al. 2015) up to 4,400 m a.s.l. in Bhutan (Tempa et al. 2019). However, records of tiger above 3,000 m a.s.l. are rare except in India (Bhattacharya and Habib 2016; Adhikarimayum and Gopi 2018) and Bhutan (Jigme and Tharchen 2012; Tempa et al. 2019). The highest elevation in India where tiger has been recorded is 3,630 m a.s.l. as (Adhikarimayum and Gopi 2018), while there are no records of tigers above 2500 m a.s.l. in Nepal (WWF-Nepal 2020).

Tiger is listed as Endangered in the IUCN Red List of threatened species (Goodrich et al. 2015) and the National Red List Series of Nepal (Jnawali et al. 2011), and it belongs to Appendix I in the CITES (CITES 2021). This solitary carnivore is under threat due to poaching and habitat loss (Chundawat et al. 2011; Goodrich et al. 2015). Nonetheless, tiger populations are gradually increasing (DNPWC and DFSC 2018; Harihar et al. 2018; Jhala et al. 2019) since the launch of the Global Tiger Recovery Program (GTRP 2010). We captured a tiger individual in one of the cameras deployed as a part of the Red Panda, *Ailurus fulgens* (Cuvier, 1825), telemetry study in the Panchthar-Ilam-Taplejung (PIT) area of eastern Nepal (Bista et al. 2021).

Methods

We placed 46 passive infrared motion detection trail cameras (Bushnell 20/24MP Trophy Cam HD No-Glow, X-change Color Model 1279) along trails and in forest areas for 16 months from November 2019 to April 2021 in the PIT area (Fig. 1). This area supports subtropical and temperate broad-leaved forests dominated by *Rhododendron* spp., *Lithocarpus leucotrichophora*, *Daphniphyllum himalayense*, and *Acer* sp. with an understory that includes bamboo. Elevation ranges from 2,000 to 3,636 m a.s.l. in the study area, with higher elevations in the north. Cameras were placed in a grid at a minimum of 250 m apart within the home range of Red Pandas. We fastened each camera to a tree trunk at 40 cm above the ground and used a single camera in each site for an average number of 62 d (range 13–139 d). These cameras were set to take photographs 24 h/d. Trapping for 3,836 camera-days resulted 130,146 images.

Results

New records. NEPAL – **Province 1** • Ilam District/Sandakpur Rural Municipality; 3,165 m a.s.l.; 13.XI.2020; 1 adult (Fig. 2) • same locality; 21.XI.2020; 1 adult.

We recorded a single tiger as by-catch with one of these cameras on two different occasions: 13 and 21 November 2020 (Fig. 2). This camera was on a mountain ridge at 3,165 m a.s.l. along a human-walking trail. We recorded 1,724 images of humans, livestock, and other wild animals, including 16 images of a tiger in that camera. On both occasions the tiger was captured during the night (22:39 and 19:01 h). From this survey we recorded five other felids: Marbled Cat, *Pardofelis marmorata* (Martin, 1837); Asiatic Golden Cat, *Catopuma temminckii* (Vigors & Horsfield, 1827); Leopard Cat, *Prionailurus bengalensis* (Kerr, 1792); Leopard, *Panthera pardus* (Schlegel, 1857); and Clouded Leopard, *Neofelis nebulosa* (Griffith, 1821). We also recorded some major prey species: Northern Red Muntjac, *Muntiacus vaginalis* (Boddaert, 1785); Wild Boar, *Sus scrofa* (Linnaeus, 1758); Himalayan Goral, *Naemorhedus goral* (Hardwicke, 1825); Himalayan Serow, *Capricornis thar* (Hodgson, 1831); and Assam Macaque, *Macaca assamensis* (Hodgson, 1840).

Identification. We identified tiger based on pelage coloration and stripping pattern (Kitchener and Yamaguchi 2010). No other felids in the region have a similar striped coat.

Discussion

Our camera trapping provided the first evidence of tiger presence in eastern Nepal, and this evidence represents the highest elevation record of tiger in Nepal. The highest elevation previously recorded from was 2,500 m a.s.l. in Dadeldhura, far-western Nepal (WWF-Nepal 2020). There are records of tigers above 3,000 m a.s.l. in Bhutan and India. The first photographic evidence above 3,000 m a.s.l., which included pugmarks on snow at 4,110 m a.s.l., was made in Bhutan in 2000 (Yonzon 2000). Since then, researchers have recorded more evidence of tigers above 3,000 m a.s.l. in Bhutan (Jigme and Tharchen 2012; Sangay et al. 2014) and India (Bhattacharya and Habib 2016; Adhikarimayum and Gopi 2018).

Tigers in the forest on the Indian side of the Singalila Range do not appear to be new. Previous sightings from the Singalila Range were made until 1937, from Kalpokhari and Chiwabhanjyang (Baldry 1926) and Tonglu (Wood 1937), which are all above 3,000 m a.s.l.. However, no records have been made over the past 80+ years. In the past few years, local people have reported roars, pugmarks, and predation of livestock by tigers in the PIT area (S.B. Rai pers. comm., 2017). These accounts seem credible because the descriptions of the striped pattern of the body do not resemble other big cats of that region. These records suggest that tigers have been an occasional visitor to the PIT and adjoining forests in India.

The nearest areas where tiger have been confirmed are recently reports in Mahandanda Wildlife Sanctuary (MWS) and Neora Valley National Park in India
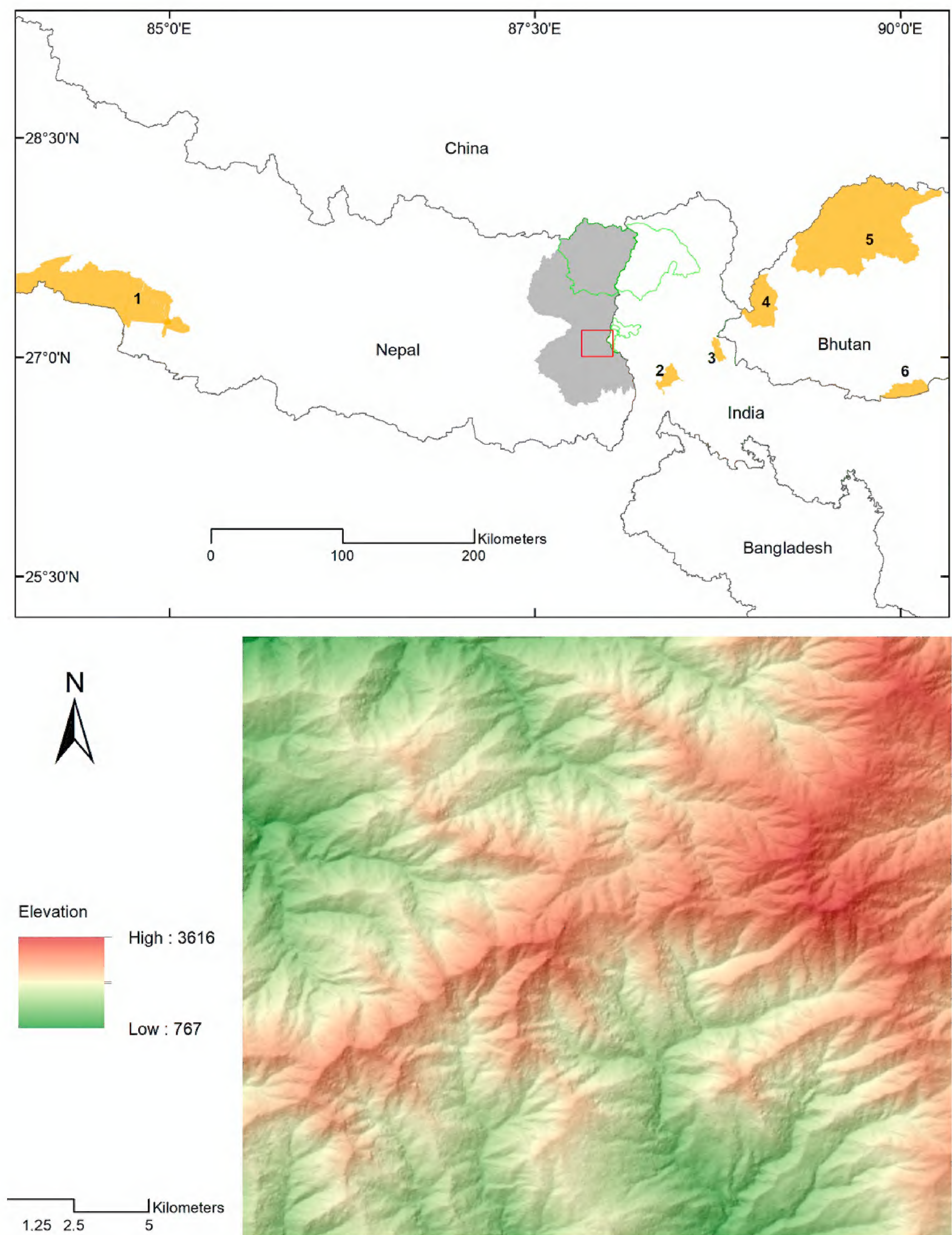
Figure 1. Study area. The elevation map shows the region where the tiger was recorded in the PIT area. Nepal and neighbouring countries are shown in inset map. The grey colour shows the PIT area with light-green polygons representing protected areas in Nepal: Kanchenjunga Conservation Area, and India: Singalila National Park (SNP), Barsey Rhododendron Sanctuary (BRS) and Khangchendzonga National Park. The Singalila range covers the mountain ridge between PIT area, SNP and BRS. The orange areas depict the protected areas as potential tiger sources: 1) Chitwan-Parsa area; 2) Mahananda Wildlife Sanctuary; 3) Neora Valley National Park; 4) Jigme Khesar Strict Nature Reserve; 5) Jigme Dorji National Park; and 6) Phipsoo Wildlife Sanctuary.

(Jhala et al. 2019; Mallick 2019; Chatterjee et al. 2020); Jigme Khesar Strict Nature Reserve, Jigme Dorji National Park, and Phipsoo Wildlife Sanctuary in Bhutan (DoFPS 2015); and Chitwan-Parsa area in Nepal (DNPWC and DFSC 2018) (Fig. 1). Being close to the PIT area, the MWS seems the most likely source of the tiger reported here. However, tigers may disperse over large areas, up to 3,000 km (BBC 2020), which raises the possibility that the tiger in the PIT area may have originated from any of these three countries.

Dispersing individuals need more space for establishing their own territories, but a lack of suitable and

Figure 2. *Panthera tigris tigris* recorded in a trail camera in Ilam, eastern Nepal.

accessible habitat and proper management for increasing tiger populations may increase tiger mortality and aggravate human-wildlife conflict (Acharya et al. 2016). Such human-tiger conflict is on the rise in Nepal, as 10 human casualties and more than half a dozen human injuries were reported in nine months between July 2020 and April 2021 (NTNC 2021). These incidents indicate the need for a management plan for tigers and their habitat, as there is no tolerance of human casualties (Bhattarai and Fischer 2014).

The average home range of a Bengal Tiger in the mountains is 70 km² for females and 169 km² for males (Tempa et al. 2019). Females maintain their exclusive home ranges and avoid overlapping the range of neighbouring females, while males overlap the ranges of up to three females (Goodrich et al. 2015). This spatial pattern suggests that the PIT area would serve as home for only a few resident tigers, but it may provide a corridor to connect Bhutan and north-east Indian tiger populations with those of Nepal and western India.

The potential tiger range covers most of the mid- and high-mountain ranges of Nepal, India, and Bhutan, with a high possibility of dispersal between these countries (GTF 2019). However, most of studies on tigers are from lowlands, and there is very little scientific understanding about tigers in mountain ranges (Bhattacharya and Habib 2016; Tempa et al. 2019). Perhaps this could

be a reason of limited information available on tiger from the high elevation. Future studies using camera trapping and other evidence-based methods in mountain regions may unveil more unusual records. Further studies are needed on the occupancy, assessment, and connectivity of tiger habitats in mid- and high-mountain ranges of Nepal and other countries.

The PIT area also harbors Red Panda, another Endangered species in the eastern Himalaya (Glatston et al. 2015; Bista et al. 2021). The rich assemblage of carnivores and prey species with high relative abundance (Lama 2018) shows the significance of the PIT area as a biologically important corridor and reinforces the need to prioritize this area for conservation. However, the habitat loss and fragmentation is evident in this region. This trend of habitat loss has been increasing in recent years due to road construction, and livestock herding is further aggravating this trend. Therefore, our new record of tiger in the PIT area highlights the need to assess the feasibility of the area as a potential biological corridor to benefit Tiger, Red Panda, and other sympatric species.

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